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YOUNG BASILE 3001 WEST BIG BEAVER ROAD SUITE 624 TROY, MI 48084			EXAMINER LEE, BENNY T	
			ART UNIT 2817	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/558,150	Applicant(s) MORTAZAWI ET AL.	
	Examiner Benny Lee	Art Unit 2817	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 June 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 10 and 34-41 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 10; 34; 40,41,35-39 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 May 2009 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 21 May 2009 has been entered.

The substitute specification filed 21 May 2009 has been approved and has replaced the preceding specification:

The disclosure is objected to because of the following informalities in the disapproved substitute specification of 21 May 2009: In paragraph [0043], it is noted that if reference label " l_2 " is "not shown in FIG. 1", then it should be made clear where such a reference label is shown (i.e. which other figures). Clarification is needed. In paragraphs [0044] & [0050], note that reference label "L" does not appear consistent with the labeling in FIG. 2 (i.e. L_1 , L_2 , L_{N-1} , etc appear in FIG. 2) and needs clarification. In paragraph [0059], note that reference to parameter " $3(G+jB)$ " is vague in meaning and needs clarification. Note that in the detail description of new FIGS. 26 & 27 (i.e. in paragraphs [0069] & [0070], respectively), reference labels "C" & "I" do not appear consistent with the labeling in the corresponding figures (i.e. (C_1 , C_2 , $C_3 \dots C_N$) in FIG. 26; (l_1 , l_2 , l_3 , ... l_N) in FIG. 27, respectively) and thus needs clarification. Appropriate correction is required.

The disclosure is objected to because of the following informalities: Note that in the description of the circuits depicted in Figs. 1, 2, 3, 10, 13, 14, 15, 21, all reference labels which are unique to a particular drawing figure should be corresponding described in the specification for clarity of description. As noted earlier by applicants', any reference label appearing in a

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particular drawing figure and which has already been described relative to an earlier drawing figure need not be further described. Note that respect to the graphs depicted in Figs. 4, 5, 6, 8, 10, 12, 16, 17, 18, 20, 23, 24, 25, further elaboration of important aspects or features depicted by the curves in the respective graphs should be provided for clarity of description. Appropriate correction is required.

The use of the trademark "RT/DUROID" (e.g. paragraphs [0049] & [0067]) has been noted in this application. It should be capitalized wherever it appears and be accompanied by the generic terminology. In particular, note that the generic terminology for RT/DUROID should be provided.

Although the use of trademarks is permissible in patent applications, the proprietary nature of the marks should be respected and every effort made to prevent their use in any manner which might adversely affect their validity as trademarks.

The drawings are objected to because of the following: Note that the replacement drawings filed 21 May 2009 have been found objectionable since certain drawing figures are of such poor quality (i.e. as compared to the quality of the originally filed drawings), such that certain features and reference labels therein are not discernable as to what they represent and thus a new set of replacement drawings need to be provided; In Fig. 13, note that reference labels --2(G-jB)-- & --3(G+jB)-- still need to be provided such as to be commensurate with the specification description thereof.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure

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must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claims 34; 40, 35-39, 41 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 34, lines 2 & 3, note that "the single extended resonance circuit topology" lacks strict antecedent basis since the first positive recitation of this limitation appears in line 4 of this claim; lines 12, 13, note that the reference to "the tunable impedance" is vague in meaning as to which one of the "first tunable impedance" & "second tunable impedance", is intended by such a recitation and thus clarification is needed; line 13, note that "to it's the conjugate" is vague in meaning and needs clarification; line 16, note that it is unclear how "a second impedance" is intended to be related to the earlier recitation of "a second tunable impedance" (i.e. the same impedance, a different second impedance, etc), and thus needs clarification.

In claims 35, 36, 37, note that reference to "the series impedance" is vague in meaning as to which one of the "antenna cells" such a recited "series impedance" is intended to be associated with and thus needs clarification.

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In claim 37, similarly note that reference to “the shunt impedance” is vague in meaning as to which one of the “antenna cells” such a recited “shunt impedance” is intended to be associated with and thus needs clarification.

In claim 38, it is noted that “the plurality of ports” lacks strict antecedent basis.

In claim 40, last paragraph therein, first line therein, note that it is unclear how “serial impedance” relates to the earlier recitation of “series impedance” and thus needs clarification. Also, note that it is unclear whether the “admittance at each port” is transformed to “a conjugate admittance” at the same port is an appropriate characterization, especially in view of the recitation in claim 34 (i.e. admittance of one port is transformed to the conjugate admittance of another port) and thus clarification is needed.

In claim 41, note that it is unclear with respect to which one of the “antenna cells” is the recitation of the “extended resonance circuit” & the “power divider”, respectively intended.

The following claims have been found to be objectionable for reasons set forth below:

In claim 40, it is noted that a --)-- should be inserted to close off the status identifier for this claim.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out

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the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 34; 40, 35-39, 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kirino in view of Mantele (both of record).

Kirino {e.g. Fig. 7(b)} each disclose a one dimensional phase array antenna (e.g. 801) comprising a plurality of series connected or cascaded phase shift elements (e.g. 805a, 805b, 805c) defining a plurality of divider ports located between adjacent phase shift elements separated by a prescribed distance and to which respective antennas (e.g. radiating patches 804a-804d) are connected. An alternating signal source (e.g. an un-shown signal source connected to feeding terminal 807) is connected to a first of the divider ports for supplying a signal to the phase array antenna through the series connected phase shift elements. Note that as the signal applied by the source propagates through the series connected phase shift elements, each phase shift element imparts a desired amount of phase shift (e.g. phase shift Φ in Kirino) as to provide a successive phase difference to the propagating signal at each dividing port such that the signal is radiated by the corresponding antenna with the different amount of phase shift. Moreover, as described at column 17, lines 57-62, the radiation impedance at each patch (i.e. antenna) and a matching ratio of the each matching device (i.e. 812) are selected to that a leakage electric power from each patch is the same (i.e. the power is equally divided at each antenna patch). However, the phase array antenna of Kirino differs from the claimed invention since the phase shift elements do not explicitly disclose first series tunable elements and second tunable elements parallel connected to a respective antenna.

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Mantele discloses, with respect to Fig. 1, a phase shifter configuration comprising a transmission line (i.e. 50) defined by serially aligned distributed parameters and parallel connected varactors (i.e. 52, 54). Note that transmission line (50) is considered “tunable” by virtue of being designed to a different inductive reactance and where the varactors are considered tunable by the application of control voltage (64) to change the capacitance of the varactor as depicted in the general description of Fig. 5. Moreover, it should be noted that such series connected inductors, by virtue of the designed inductive reactance, would necessarily provide an impedance inversion from one end to an inductor to the other end of the inductor, as known to those of ordinary skill in the art.

Accordingly, it would have been obvious in view of the references, taken as a whole, to have realized the series connection of phase shift elements in the phase array antenna of Kirino to have been realized by a series connected phase shift configuration as taught by Fig. 1 of Mantele. Such a modification would have been considered an obvious substitution of art recognized equivalent series connected phase shift configurations, thereby suggesting the obviousness of such a modification. It should be noted that the series connection of plural phase shift elements as taught by Mantele would obviously have been compatible with the series connection of the generic phase shift elements in Kirino, thereby further suggesting the obviousness of such a modification. It should be noted that as an obvious consequence of using the series connected phase shift elements of Mantele, such a combination would have necessarily included the respective varactors being connected in parallel with the corresponding antenna, such as to have been consistent with the teaching in the primary reference (i.e. plural antennas) as modified by Mantele (i.e. parallel varactors). It should be noted that for the transforming of

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the admittance to the conjugate impedance at each antenna port, while Kirino does not explicitly disclose such an electrical effect, such an effect, by virtue of the selecting the impedance (and thus the admittance) of the antenna and the impedance matching circuit, those of ordinary skill in the art would have found it obvious to have selected a conjugate admittance as a desirable impedance characteristic, especially since selecting the conjugate admittance would necessarily compensate for the imaginary component of the impedance, thereby leaving the real component of impedance at each antenna port. Moreover, as known to those of ordinary skill in the art, the transmission line can be alternatively be realized by series inductors designed to a desired length (e.g. quarter wavelength corresponding to a desired inductive reactance) as an obvious design consideration. Similarly, by virtue of designing the two inductors to be quarter wavelength each, the corresponding electrical length of the equivalent transmission line would obviously have been one-half wavelength, thereby providing a half-wavelength distance between adjacent antennas through the series connected phase shift elements.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kirino in view of Mantele (both of record) and Hyman et al.

As described in the above rejection, the combination of Kirino & Mantele discloses the claimed invention except for the second tunable parallel element being a either a switchable capacitor or a switching transmission line, such as recited in claim 10.

Hyman et al (e.g. FIGS. 1A, 1B, 1D) discloses a generic phase shifter connected in parallel to ground. Moreover, note that FIG. 1B discloses that a parallel to ground phase shifter can be characterized by an equivalent parallel varactor circuit. Furthermore, as evident from FIG.

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1D, the parallel to ground phase shifter can be equivalently characterized by parallel capacitors (8) selectively connected through a switching object (27).

Accordingly, it would have been obvious in view of the references taken as a whole to have further modified the parallel to ground varactor circuit of the above combination to have been a circuit having parallel capacitors selectively connected, such as depicted in FIG. 1D of Hyman et al. Such a modification would have been considered an obvious substitution of art recognized parallel to ground phase shifter circuits, especially since Hyman et al recognized that a parallel to ground varactor circuit is an art recognized equivalent to a circuit having parallel capacitors selectively connected, thereby suggesting the obviousness of such a modification.

Applicant's arguments filed 21 May 2009 have been fully considered but they are not persuasive.

With respect to the objection to the trademark "RT/DUROID", contrary to applicants' assertion, the mere reference to the trademark "RT/DUROID" as being a "substrate" is insufficient to identify the specific material composition constituting the "generic terminology".

With respect to the above rejection, applicants' have contended that the rejection fails to account for the phase shifters and power dividers to be one in the same entity and thus performs phase shifting and equal power division simultaneously. It has been further asserted that the prior art rejection of record fails to account for the transforming of the admittance to a conjugate admittance to achieve such a result.

In response, the examiner has considered applicants' assertions, but have found such assertions unpersuasive. In particular, the examiner notes that the Kirino reference does indeed appear to define a serial feed path with respective phase shifters therein which must necessarily

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function to provide phase shift as well as provide equal power division simultaneously. That is to say, a signal applied by the power source traveling through the serial feed path must necessarily experience equal power division by virtue of the selection of the impedance of the patch antenna and the matching ratio of matching device (812) as described at column 17, lines 57-62, thereby providing for equal power division and must also necessarily experience a corresponding phase shift by virtue of the signal passing through the phase shifters disposed in the serial feed path (e.g. see column 18, lines 4-13). Thus, by virtue of the phase shifters arranged in the serial feed path in each prior art reference, the examiner believes that such a configuration must necessarily function to provide a phase shift and equal power division simultaneously. As for the transforming of the admittance to the conjugate impedance at each antenna port as set forth in the above rejection, while Kirino does not explicitly disclose such an electrical effect, it should be noted that by virtue of the selecting the impedance (and thus the admittance) of the antenna and the impedance matching circuit, those of ordinary skill in the art would have found it obvious to have selected a conjugate admittance as a desirable impedance characteristic, especially since selecting the conjugate admittance would necessarily compensate for the imaginary component of the impedance, thereby leaving the real component of impedance at each antenna port.

Any inquiry concerning this communication should be directed to Benny Lee at telephone number 571 272 1764.

**/BENNY LEE/
PRIMARY EXAMINER
ART UNIT 2817**

B. Lee